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10/577,875	12/06/2006	Kazuaki Katagiri	290088US0X PCT	6761
22850	7590	06/01/2009		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER SAHA, BIJAY S	
			ART UNIT	PAPER NUMBER
			1793	
			NOTIFICATION DATE	DELIVERY MODE
			06/01/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/577,875	Applicant(s) KATAGIRI ET AL.	
	Examiner BIJAY S. SAHA	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
4a) Of the above claim(s) 1-6,8-14 and 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 7 and 15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Election acknowledged

Applicants' election **with** traverse of group II invention **claims 7 and 15** drawn to a first method of making a carbon nanotube dispersed composite material in the reply filed on 03/30/2009 is acknowledged.

The traversal is on the ground(s) that there would be serious burden if restriction is not required and why each group lacks unity with each other. Applicants' further state that examiner has not provided any indication that the contents of the claim interpreted in light of the description in making the assertion of a lack of unity.

This is not found persuasive because the current application is filed as a National stage application of PCT/JP04/16495 under 371; hence, US Practice of serious burden does not apply. Under PCT Rule 13.1 and PCT Rule 13.2, the inventions listed as **Groups I - X** do not relate to a single general inventive concept because the shared special technical feature does not make a contribution over the prior art. The **claim 1** is drawn to carbon nano tube composite material where carbon nanotubes are dispersed and integrated in the form of a net work into a discharge plasma sintered body comprising a ceramic or metal powder. The special technical feature of **claim 1** is known in the art.

Claim 1 is obvious over JP 10168502 (JP '502) in view of JP 2000-128648 (JP '648). JP 502 teaches a composite material comprising (1) carbon nanotubes and (2) a

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metal powder and as is shown in claim 15, this mixture is sintered. Although the discharge plasma sintering aspect is not literally defined, this would be obvious since the hot pressing is performed from 20 -1500°C. At the time of invention, it would be obvious to a person of ordinary skill to synthesize the carbon nanotube composite material (JP '502) utilizing the discharge plasma (JP '648). The suggestion or motivation for doing so would have been to make a homogenous compact body that has low defect.

The requirement is still deemed proper and is therefore made **FINAL**.

Group I, **claims 1-6** and **18-20**, drawn to a carbon nanotube dispersed composite material, group III, **claim 8**, drawn to a second different method of making a carbon nanotube dispersed composite material, group IV, **claim 9**, drawn to a third different method of making a carbon nanotube dispersed composite material, group V, **claim 10**, drawn to a fourth different method of making a carbon nanotube dispersed composite material, group VI, **claim 11**, drawn to a fifth different method of making a carbon nanotube dispersed composite material, group VII, **claim 12**, drawn to a sixth different method of making a carbon nanotube dispersed composite material, group VIII, **claim 13**, drawn to a seventh different method of making a carbon nanotube dispersed composite material, group IX, **claim 14**, drawn to a eighth second different method of making a carbon nanotube dispersed composite material, group X, **claims 16-17**, drawn to a heat exchanger comprising carbon nanotubes are withdrawn from further

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consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group of invention, there being no allowable generic or linking claim. **Claims 7 and 15** are presented for examination on the merit.

Status of Application

The **claims 7 and 15** are pending and presented for the examination. The non-elected **claims 1-6 and 8-14 and 16-20** are withdrawn from the consideration.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding **Claim 15**, **claim is** drawn to “low temperature under low pressure” and “low temperature under high pressure”. The terms “low” and “high” are qualitative. Corrective action is required.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisaji et al JP 10 168502 (JP'502) in view of Shotaro et al JP 2000 128648 (JP'648).

Regarding **Claims 7 and 15**, JP'502 teaches a method of producing a carbon nanotube (claim 4 and 11), dispersed (page 5 para 0013) composite material (Title, Claim 1, 2), metal powder (claim 1 and claim 3), carbon nanotubes (claim 4, 11) in an amount of 1-200 wt% (claim 2) by a ball mill (claim 12), hot pressing at 20-1500°C (para 0015), a pressure of 10000 kg/cm² (para 0016), at a suitable temperature and compacting pressure (para 0016).

Although JP'502 teaches hot pressing at a suitable temperature (Page 5 para 0016) and pressure (claim 5, para 0016), JP'502 does not explicitly teach sintering by discharge plasma.

JP'648 teaches discharge plasma sintering method (Abstract, claim 1) to obtain the sintered body and sintering by hydrostatic pressurization with electric discharge plasma (claims 2 and 3), hydrostatic pressurization 0.1-20 tf/cm² (page 6 para 0032).

At the time of invention, it would be obvious to a person of ordinary skill to synthesize the carbon nanotube composite material (JP '502) utilizing the discharge plasma (JP '648). The suggestion or motivation for doing so would have been to make a homogenous compact body that has low defect (JP'648).

Examiner considers that pressure is applied during the compaction of the carbon nano tubes dispersed in ceramic; subsequently, a green body is formed. Sintering of the green body produces the final product. A green body can be formed even at a zero pressure; however such a green body would have high internal porosity that would result inhomogeneous compact body. A higher compaction pressure leads to a homogeneous compact body compared to no pressure or a low pressure. JP'502 teaches compaction pressure as high as 10000 kg/cm^2 (para 0016 page 5) where as JP'648 teaches compaction pressure in the range of $0.1 - 20 \text{ tf/cm}^2$. The lower value of the range, for example 0.1 tf/cm^2 , may be considered as low pressure in the first stage of compaction. A second stage of compaction consisting the pressure close to the upper range, for example 20 tf/cm^2 or close to 10000 kg/cm^2 may further reduce the internal porosity and make a homogenous compact body as suggested by JP'648.

Summary

The **claims 7** and **15** are rejected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BIJAY S. SAHA whose telephone number is (571) 270-

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5781. The examiner can normally be reached on Monday- Friday 8:00 a.m. EST - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Mayes can be reached on (571) 272 1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BIJAY S SAHA/
Examiner, Art Unit 1793

BSS
May 17, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793